

STUDIES ON THE INTRASPECIFIC VARIATIONS IN
TRITHEMIS FESTIVA (RAMBUR) (ODONATA:
LIBELLULIDAE)¹

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(With six text-figures)

INTRODUCTION

Like many other insects, variations within the species is common in order Odonata. These variations have been briefly studied and reported from time to time in different species of dragonflies. Asahina (1952-53), while studying the Odonata material collected from Nepal by Japanese Himalayan expedition has noted the variations within the different species, similarly Singh & Baijal (1954) in Western Himalaya dragonflies; Baijal & Agarwal (1955) in Madhya Pradesh dragonflies; Sahni (1965a, 1965b) in the Odonata of Kumaon hills; Raychaudhari *et al.* and Lahiri *et al.* (1970) in *Brachythemis contaminata* (Fabricius), *Diplacodes trivialis* (Rambur) and *Crocothemis servilia servilia* (Drury); Varshney & Guha (1972) in *Rhyothemis variegata variegata* (Linn.); Lahiri & Mitra (1972) in *Acanthagyna dravida* (Lief.); Kumar & Prasad (1976) in *Orthetrum garhwalicum* Singh & Baijal; Singh & Prasad (1976, 1977) and Prasad & Singh (1976, 1977) in Doon Valley and Corbett National Park dragonflies; Prasad (1976a, 1976b and in press) in Western

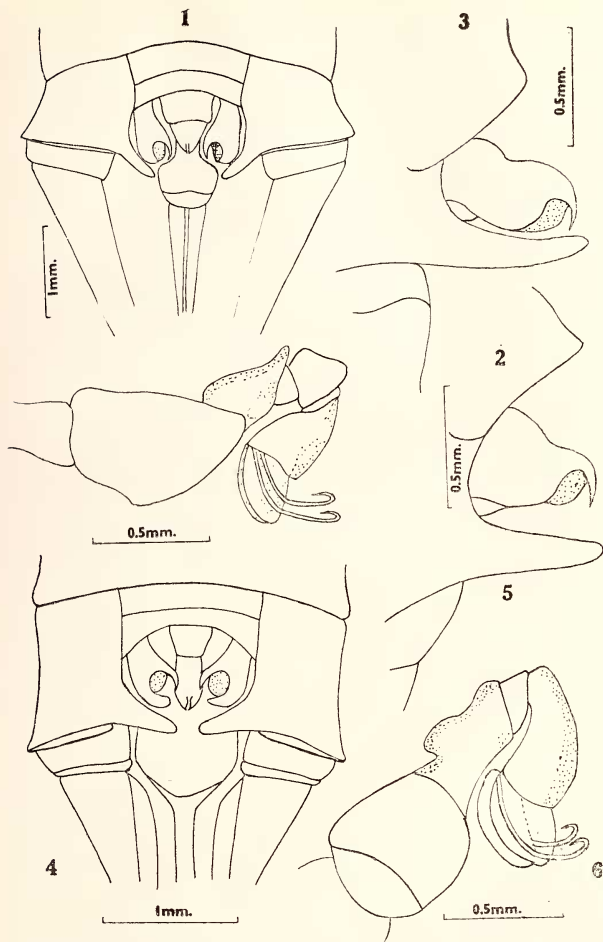
Himalaya and Eastern Uttar Pradesh Odonata; Bose & Mitra (1977) in Rajasthan dragonflies and Lahiri (1977) in Manipur dragonflies studied and have made brief remarks on intraspecific variations. However, these records are only occasional variations in small number of specimens, no attempt has so far been made for detailed biometrical study of intraspecific variations in Indian dragonflies. During the course of Odonata collection over many years in Western Himalaya, we noted distinct pattern of intraspecific variation in *Trithemis festiva* (Rambur), a species fairly common throughout lesser Himalayan range. We noticed the occurrence of two distinct group of specimens large sized and small sized. Kiauta (1969) also reported the occurrence of small size specimen (♀) from Nepal and states that "its abdominal length amounts scarcely to 21 mm. and that of the hind wing to 27 mm." Keeping the above in view we made a detailed study of intraspecific variations in *Trithemis festiva* (Rambur) on the basis of material collected from various localities in Western Himalaya. The species is widely and commonly distributed throughout Indian sub-continent (Kiauta 1969). Adults are common on the wing from March-April to November; larvae occur in slow running marshy streams and near the weedy banks of rivers (Kumar 1972).

¹ Accepted May 1978.

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Figs. 1-3. Male accessory genital structures of large sized specimens of *Trithemis festiva* (Rambur): 1. Ventral view, 2. Lateral view, 3. Enlarged view of Prophallus and Vesicula spermalis.

Figs. 4-6. Male accessory genital structures of small sized specimens of *Trithemis festiva* (Rambur): 4. Ventral view, 5. Lateral view, 6. Enlarged view of Prophallus and Vesicula spermalis.

OBSERVATIONS

Male : (Refer Tables II, III & VI for various measurements)

Both large and small dragonflies, present at same localities, are violaceous black in colour. Head small in size, eyes contiguous, labium blackish brown in large size specimens while small size specimens it is black, some times yellowish brown. Labrum and mandibles black, anteclypeus black to yellowish brown, postclypeus dark olivaceous brown to black, occiput dark brown to black. Eyes brown above and black beneath.

Prothorax dark blue to black, small posterior lobe is black, not fringed with hairs. Thorax narrow, black and coated with thin purplish pruinecence. Legs, long, black but hind femora with small closely set spines, and with a single set of long spines present on its distal end.

Wing hyaline, a dark opaque brown marking present only in hind wing of large size specimens, but in small size it is found both in fore and hind wings. The brown marking in the hind wing extends upto the subcosta, cubital space, beyond the cubital nervure and posteriorly beyond the membrane. In fore wing of small size specimens it extends upto the cubital space and posterior border of the wing. Reticulation close, and are situated between the 1st and 2nd antenodal nervurer, cubital nervure one, pterostigma black and cover 2 cells. Node nearer to pterostigma than base in both wings. Nodal index varies from

$$\frac{6.9\frac{1}{2}}{8.7} \Big| \frac{9\frac{1}{2}-5}{7.8} \quad \text{to} \quad \frac{9.11\frac{1}{2}}{10.8} \Big| \frac{12\frac{1}{2}-8}{8.9} \quad \text{in large sized}$$

specimens, while $\frac{6.10\frac{1}{2}}{8.7} \Big| \frac{10\frac{1}{2}-6}{8.7}$ to $\frac{9.11\frac{1}{2}}{8.8} \Big| \frac{11\frac{1}{2}-9}{9.11}$ in small sized specimens. Discoidal cell in the fore wing narrow, its costal side just half

of proximal side and traversed only once. Subtrigone 3-celled, sector of arc with a large fusion at its origin. Distal antenodal nervures incomplete, discoidal field begins with 3 rows of cells and is convergent at wing border. In hind wing discoidal cell entire, CUII arising from the posterior angle of discoidal cell. Discoidal field begins with 2 rows of cells. 2 rows of cells present in between IRIII & RSPL. Membrane dark brown and triangular in shape.

Abdomen 20.0-25.5 mm in length, black; anal appendages black.

Female : (Refer Tables IV, V & VI for various body measurements)

Labium yellowish-brown, its middle lobe black, labrum yellow and sides black. Ante and postclypeus yellow, face and frons yellowish brown, but some portion of upper sides of frons metallic blue. Upper portion of eyes brown and lower portion black, occiput black. Prothorax black, thorax yellow and marked with black, mid-dorsal carinal suture present upto the anterior sinus. Hamular stripe very thick, an inverted Y-shaped stripe present on the mesepimeron. The posterior—lateral suture short but oblique stripe ends across the meta-pimeron. Lower portion of the thorax yellow and marked with black stripe. Legs black, inner side of the anterior femora yellow, coxae and trochanter yellow.

Wings similar to the male, except the base of the hind wing which is marked with opaque brown marking upto the costal area, costal space and upto the cubital nervures and near the membrane. Nodal index varies from

$$\frac{8.10\frac{1}{2}}{8.7} \Big| \frac{11\frac{1}{2}-7}{8.9} \quad \text{to} \quad \frac{9.12\frac{1}{2}}{9.8} \Big| \frac{10\frac{1}{2}-8}{8.9}$$

Abdomen (20-23 mm in length) black and marked by yellow, dorsally, laterally and ventrally but its last three segments (8th, 9th and

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10th) are totally black on the dorsum, marked And appendages black, long and acutely with yellow and the lateral and ventral sides. pointed at the tips.

TABLE I

SHOWING THE FREQUENCY OF SPECIMENS WITH BOTH SMALL AND LARGE SIZED SPECIMENS OF *Tritheimis festiva* (RAMBUR) FROM DIFFERENT LOCALITIES IN WESTERN HIMALAYA.

Sl. No.	Locality	District	Large sized specimens		Small sized specimens	
			Male	Female	Male	Female
1.	Asarori	Dehra Dun	9	2	—	—
2.	Barkot	"	4	—	—	—
3.	Dehra Dun	"	1	—	—	—
4.	Donga	"	15	6	2	1
5.	Herbertpur	"	7	—	—	—
6.	Jaintanwala	"	9	3	3	—
7.	Jhajra	"	—	2	—	—
8.	Mianwala	"	2	3	—	—
9.	Motichur	"	12	2	4	—
10.	Rajpur	"	23	1	4	3
11.	Rishikesh	"	4	—	—	—
12.	Sahastra Dhera	"	60	3	9	2
13.	Boxar (Corbett National Park)	Pauri Garhwal	8	2	4	1
14.	Dhikala (Corbett National Park)	"	6	1	3	1
15.	Pauri	"	10	3	2	1
16.	Deoprayag	Tehri Garhwal	2	—	—	—
17.	Tehri	Tehri Garhwal	10	—	—	—
18.	Chamoli	Chamoli	8	—	—	—
19.	Uttar Kashi	Uttar Kashi	3	1	—	—
20.	Bij Rani (Corbett National Park)	Nainital	20	4	3	—
21.	Haldwani	"	3	—	—	—
22.	Kathgodam	"	4	1	1	—
23.	Sultan (Corbett National Park)	"	15	—	4	—
24.	Dhobighat (Ranikhet)	Almora	2	—	—	—
25.	Dwarson	"	2	—	1	—
26.	Garli	Kangra	—	—	—	1
27.	Jhankaur	"	—	2	—	—
28.	Jawalamukhi	"	12	4	—	—
29.	Kangra	"	2	4	4	2
30.	Mataur	"	4	3	—	—
31.	Maranda	"	—	—	2	—
32.	Ranital	"	15	6	2	—

TABLE II
BODY MEASUREMENTS OF LARGE SIZED SPECIMENS OF *Trithemis festiva* (RAMBUR) (MALE)

S. No. of specimens	Abdomen with anal appendages	Fore Wing	Hind Wing	Length in between base to node		Length in between node to pterostigma		Maximum width of hind wing	Pterostigma
				Fore Wing	Hind Wing	Fore Wing	Hind Wing		
1.	23.5 mm	32.5 mm	31.5 mm	17.00 mm	13.5 mm	11.00 mm	12.5 mm	11.00 mm	3.00 mm
2.	23.00 mm	31.5 mm	30.5 mm	16.5 mm	13.5 mm	10.5 mm	11.5 mm	10.00 mm	3.00 mm
3.	23.5 mm	32.00 mm	31.00 mm	17.00 mm	14.00 mm	10.5 mm	12.5 mm	10.5 mm	2.5 mm
4.	23.00 mm	32.00 mm	31.00 mm	17.00 mm	14.00 mm	11.00 mm	12.5 mm	11.00 mm	3.00 mm

TABLE III
BODY MEASUREMENTS OF SMALL SIZED SPECIMENS OF *Trithemis festiva* (RAMBUR) (MALE)

Sl. No. of specimens	Abdomen with anal appendages	Fore Wing	Hind Wing	Length in between base to node		Length in between node to pterostigma		Maximum width of hind wing	Pterostigma
				Fore Wing	Hind Wing	Fore Wing	Hind Wing		
1.	21.5 mm	28.5 mm	27.00 mm	15.5 mm	12.5 mm	9.00 mm	11.00 mm	9.00 mm	3.00 mm
2.	21.00 mm	28.5 mm	27.5 mm	15.5 mm	12.5 mm	9.00 mm	10.5 mm	9.00 mm	2.5 mm
3.	21.5 mm	29.00 mm	28.5 mm	15.5 mm	13.00 mm	9.00 mm	11.00 mm	9.5 mm	3.00 mm
4.	22.00 mm	29.5 mm	29.00 mm	16.00 mm	13.00 mm	9.00 mm	11.00 mm	9.5 mm	2.5 mm
5.	20.00 mm	28.00 mm	26.00 mm	14.5 mm	13.00 mm	9.00 mm	10.5 mm	9.5 mm	2.5 mm
6.	20.5 mm	28.5 mm	27.5 mm	15.5 mm	12.00 mm	9.00 mm	10.5 mm	9.5 mm	2.5 mm
7.	21.00 mm	28.00 mm	27.00 mm	14.5 mm	12.00 mm	9.00 mm	10.5 mm	9.00 mm	2.5 mm
8.	20.5 mm	29.00 mm	28.00 mm	14.5 mm	12.5 mm	9.5 mm	11.00 mm	9.5 mm	3.00 mm

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TABLE IV
BODY MEASUREMENTS OF LARGE SIZED SPECIMENS *Tritheimis festiva* (RAMBUR) (FEMALE)

Sl. No.	No. of specimens	Abdomen with anal appendages	Fore Wing		Hind Wing	Length in between base to node		Length in between node to pterostigma		Maximum width of hind wing	Pterostigma
			Fore Wing	Hind Wing		Fore Wing	Hind Wing				
								Fore Wing	Hind Wing		
1.	8	22.5 mm	31.00 mm	30.00 mm	16.5 mm	14.00 mm	9.5 mm	11.5 mm	10.00 mm	3.00 mm	
2.	6	22.5 mm	31.00 mm	30.00 mm	16.5 mm	13.5 mm	9.5 mm	11.00 mm	10.5 mm	3.00 mm	
3.	12	22.5 mm	31.00 mm	30.00 mm	17.00 mm	13.5 mm	9.5 mm	12.00 mm	10.5 mm	3.00 mm	
4.	7	23.00 mm	31.00 mm	30.00 mm	17.00 mm	13.00 mm	9.5 mm	11.5 mm	10.5 mm	3.00 mm	
5.	18	22.5 mm	31.00 mm	29.5 mm	17.00 mm	13.00 mm	9.5 mm	11.5 mm	10.5 mm	3.00 mm	
6.	1	23.00 mm	32.00 mm	31.00 mm	16.5 mm	13.00 mm	10.00 mm	12.00 mm	10.5 mm	3.00 mm	

TABLE V
BODY MEASUREMENTS OF SMALL SIZED SPECIMENS OF *Tritheimis festiva* (RAMBUR) (FEMALE)

Sl. No.	No. of specimens	Abdomen with anal appendages	Fore wing		Hind wing	Length in between base to node		Length in between node to pterostigma		Maximum width of hind wing	Pterostigma
			Fore wing	Hind Wing		Fore Wing	Hind Wing				
								Fore Wing	Hind Wing		
1.	6	20.5 mm	29.00 mm	28.00 mm	15.5 mm	12.00 mm	9.00 mm	10.5 mm	9.5 mm	3.00 mm	
2.	2	20.5 mm	29.5 mm	28.00 mm	15.00 mm	12.5 mm	9.00 mm	10.5 mm	9.5 mm	3.00 mm	
3.	3	20.00 mm	28.00 mm	27.00 mm	15.00 mm	12.00 mm	8.5 mm	10.00 mm	9.5 mm	3.00 mm	
4.	1	20.00 mm	28.00 mm	26.5 mm	14.5 mm	12.5 mm	8.5 mm	10.00 mm	9.5 mm	3.00 mm	

TABLE VI

SHOWING VARIATION IN NODAL INDEX WITHIN THE LARGE AND SMALL SIZED SPECIMENS OF *Trithemis festiva* (RAMBUR)

Large Sized				Small Sized			
$\frac{6-9\frac{1}{2}}{8-7}$	$\frac{9\frac{1}{2}-5}{7-8}$	$\frac{7-10\frac{1}{2}}{9-8}$	$\frac{10\frac{1}{2}-7}{8-8}$	$\frac{6-10\frac{1}{2}}{8-7}$	$\frac{10\frac{1}{2}-6}{8-7}$	$\frac{7-10\frac{1}{2}}{8-8}$	$\frac{10\frac{1}{2}-8}{7-8}$
$\frac{8-9\frac{1}{2}}{10-7}$	$\frac{9\frac{1}{2}-7}{7-7}$	$\frac{7-11\frac{1}{2}}{8-8}$	$\frac{11\frac{1}{2}-7}{7-8}$	$\frac{7-12\frac{1}{2}}{9-8}$	$\frac{11\frac{1}{2}-8}{8-9}$	$\frac{7-10\frac{1}{2}}{8-8}$	$\frac{10\frac{1}{2}-7}{8-8}$
$\frac{8-10\frac{1}{2}}{10-7}$	$\frac{10\frac{1}{2}-9}{8-10}$	$\frac{9-10\frac{1}{2}}{9-7}$	$\frac{9\frac{1}{2}-8}{7-9}$	$\frac{8-10\frac{1}{2}}{8-7}$	$\frac{11\frac{1}{2}-7}{8-9}$	$\frac{8-10\frac{1}{2}}{8-7}$	$\frac{11\frac{1}{2}-8}{7-8}$
$\frac{9-12\frac{1}{2}}{9-8}$	$\frac{10\frac{1}{2}-8}{8-9}$	$\frac{8-10\frac{1}{2}}{8-8}$	$\frac{10\frac{1}{2}-8}{7-9}$	$\frac{8-10\frac{1}{2}}{9-8}$	$\frac{11\frac{1}{2}-8}{8-10}$	$\frac{8-11\frac{1}{2}}{10-7}$	$\frac{11\frac{1}{2}-9}{7-10}$
$\frac{9-11\frac{1}{2}}{9-8}$	$\frac{11\frac{1}{2}-9}{8-10}$	$\frac{9-11\frac{1}{2}}{10-8}$	$\frac{12\frac{1}{2}-8}{8-9}$	$\frac{9-11\frac{1}{2}}{8-8}$	$\frac{11\frac{1}{2}-9}{9-11}$		

TABLE VII

SHOWING VARIATION IN BODY MARKING OF BOTH LARGE AND SMALL SIZED *Trithemis festiva* (RAMBUR) COMPARED WITH THE PUBLISHED DESCRIPTION OF THE SPECIES

Sl. No.	Different parts of body	Large sized Specimen	Small sized specimen	Published description of the species
1.	Labium	Blackish brown	Black, sometimes yellowish brown Yellowish brown	Black
2.	Anteclypeus	Black	Black	Black
3.	Postclypeus	Dark olivaceous	Black	Dark olivaceous brown
4.	Occiput	Dark brown	Black	Black
5.	Prothorax	Dark blue	Some times a brown	Black
6.	Wing marking in male	Brown marking at the base of fore wing in male absent	marking at the base of fore wing in male present	Brown marking at the base of fore wing in male absent
7.	Nodal index	$\frac{6-9\frac{1}{2}}{8-7}$ $\frac{9\frac{1}{2}-5}{7-8}$, $\frac{9-12\frac{1}{2}}{9-8}$ $\frac{10\frac{1}{2}-8}{8-9}$,	$\frac{6-10\frac{1}{2}}{8-7}$ $\frac{10\frac{1}{2}-6}{8-7}$, $\frac{8-10\frac{1}{2}}{9-8}$ $\frac{11\frac{1}{2}-8}{8-10}$,	$\frac{8-9\frac{1}{2}}{8-8}$ $\frac{10\frac{1}{2}-7}{7-8}$, $\frac{9-11\frac{1}{2}}{10-8}$ $\frac{11\frac{1}{2}-9}{8-10}$

DISCUSSION

Both large and small sized specimens of *Trithemis festiva* occur at same localities in Western Himalaya. The abdomen (along with anal appendages) of 272 examples of large sized male specimens varies from 23.00 mm to 23.5 mm, forewing 31.5 mm to 32.5 mm, hindwing 30.5 mm to 31.5 mm and pterostigma 2.5 mm to 3.00 mm. For detail of the other body measurements in male refer to Table II. 52 examples of large sized female specimens were studied, their abdomen (along with anal appendages) varies from 22.5 mm to 23.00 mm, forewing 31.00 mm to 32.00 mm, hindwing 29.5 mm to 31.00 mm, pterostigma 3.00 mm (for other body measurements kindly refer Table IV). Only 48 male specimens of small size were studied, and their abdomen (along with anal appendages) varies in between 20.00 mm to 22.00 mm, forewing 28.00 mm to 29.5 mm, hindwing 26.00 mm to 29.00 mm, pterostigma 2.5 mm to 3.00 mm. The 12 female specimens of small size have their abdomen (along with anal appendages) 20.00 mm to 20.5 mm, forewing 28.00 mm to 29.5 mm, hindwing 26.5 mm to 28.00 mm and

pterostigma 3.00 mm (For other body measurements in male and female refer Tables III and V).

The large and small sized *Trithemis festiva* male and female are quite distinct from each other and can be easily separated from each other on the basis of their body measurements [the two type of specimens also have some differences in body colour and nodal index (refer Tables VI & VII)]. However, it is noticeable that large and small sized specimens are very close and similar to each other in their wing venation, body colour and male accessory genital structures (refer figs. 1-6). Thus the variations found in large and small sized male and female in their body measurements, wing venation, body colour are treated as intraspecific variations in *Trithemis festiva*.

ACKNOWLEDGEMENTS

We are thankful to the Director, Zoological Survey of India, Calcutta, for permission to carry out the present study. Our thanks are also due to Dr. B. S. Lamba, Deputy Director, Northern Regional Station, Zoological Survey of India, Dehra Dun, for various facilities.

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